

NHA	USED ON	MOD	LTR	DESCRIPTION	DATE	APPROVED
	412		-	Initial Release	12/05/93	<i>F.M. White</i>
			A	Added Part II, Test Results	12/15/93	<i>F.M. White</i>

	DRN <i>MRC</i>	12/9/93	<b>PREMIER AVIATION, INC.</b> GRAND PRAIRIE - TEXAS		
	CHK				
	APP				
	CONTRACT		STATIC TEST OF THE BELLY-MOUNTED SX-16 NIGHTSUN INSTALLED ON THE BHTI 412 HELICOPTER		
	PREMIER APP	12/9/93	SIZE	CODE IDENT NO.	DWG NO.
	<i>F.M. White</i>		<b>A</b>	<b>OSUV8</b>	<b>E93-304</b>
	CUST. APP		SCALE: N/A		SHEET: 1 of 13

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PREMIER AVIATION ENGINEERING REPORT NO. E93-304

STATIC TEST OF THE BELLY-MOUNTED SX-16 NIGHTSUN  
INSTALLED ON THE BHTI 412 HELICOPTER,

STC SH7744SW

PART I: TEST PLAN

BY:



Martin R. Crane

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

CODE IDENT NO.

DWG NO.

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E93-304

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## INTRODUCTION

This report documents a static test of a belly mounted SX-16 Nightsun system on a Model 412 helicopter installed in accordance with STC SH7744SW and Premier Master Drawing List B00-13014, Rev. A, dated 12/23/92. The test is being performed at the request of BHTC in order to approve the installation of the SX-16 Nightsun at BHTC. Compliance with FAR 29.303, 29.307, 29.337 will be shown by this static test.

In accordance with the test plan a downward and drag load will be applied assuming the center of gravity of the installation to be located at the gimbal pivot axis on centerline of the Nightsun assembly. The downward load simulates the limit maneuvering load factor of 3.5 g's and will be applied simultaneously with the drag load.

In addition to the static test, the clearance between the bottom of the Nightsun and the ground will be measured with the aircraft off the ground with no load on the skid gear.

The question of compatibility with the high skid gear configuration only is a matter addressed on the face of the STC, "Compatibility of this modification with previously installed equipment must be determined by the installer." There is no need to state this on the drawing.

The testing will be conducted at the Premier Aviation, Inc. facility at the Grand Prairie municipal airport. The test will be conducted by Premier Aviation personnel and will be witnessed by a Premier Aviation official representative and a BHTI representative.

The report will be updated with a PART II: TEST RESULTS, upon successful completion of the test.

STATIC TEST OF THE BELLY-MOUNTED SX-16 NIGHTSUN INSTALLED ON THE BHTI 412 HELICOPTER	SIZE	CODE IDENT NO.	DWG NO.
	A	OSUV8	E93-304
	SCALE: N/A	REV: -	SHEET: 3 of 13

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## TEST LOADS

The test loads to be applied to the installation of the SX-16 Nightsun are described below. To preclude any possible damage to the Nightsun due to application of these loads, a test fixture will be used to apply the loads through the c.g. of the nightsun.

The weight of the Nightsun and gimbal is 37 lbs.  
The mounting provision weighs 3 lbs.

### Downward load:

Basis: Pt. 29.337, Limit Maneuvering Load Factor

Load = weight \* g's \* load factor  
Load = (37 + 3) (3.5 g's) (1.5) = 210 lbs.

Downward Load = 210. lbs.

### Drag load:

$$D = C_D \frac{1}{2} \rho V^2 A$$

Drag coefficient,  $C_D = 1.12$   
Density,  $\rho = 0.002377$  slugs/ft<sup>3</sup>  
Velocity,  $V = 154$  Kts = 260 ft/sec  
Frontal Area,  $A = 1.833$  ft<sup>2</sup>

Drag Load = 165 lbs.

The downward load will be applied simultaneously with the drag load.

At the conclusion of the test, all test hardware will be inspected for any evidence of permanent deformation, damage or failure. If none is found, the test will be considered successful.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

CODE IDENT NO.

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SHEET: 4 of 13

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## GROUND CLEARANCE MEASUREMENT

The clearance between the bottom of the Nightsun and the ground will be measured with the aircraft off the ground with no load on the skid gear.

This will be accomplished with the Nightsun in the stowed position. The aircraft will be lifted with jacks or other provisions so that the skid gear is just off the ground with no weight on the gear. The minimum clearance of the Nightsun above the ground will be measured.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

CODE IDENT NO.

DWG NO.

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PREMIER AVIATION ENGINEERING REPORT NO. E93-304

STATIC TEST OF THE BELLY-MOUNTED SX-16 NIGHTSUN  
INSTALLED ON THE BHTI 412 HELICOPTER,

STC SH7744SW

PART II: TEST RESULTS

BY:   
Martin R. Crane

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

CODE IDENT NO.

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E93-304

SCALE: N/A

REV: A

SHEET: 6 of 13

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## TEST RESULTS

The static test of the belly mounted SX-16 Nightsun system on a Bell Model 412 helicopter was successfully completed. The ground clearance measurement was performed.

The Bell Model 412 helicopter used for this test was S/N 36070.

The test was witnessed by the following personnel. The Bell Helicopter representative was Mr. Gary Morton, Supervisor, NTH Product Assurance, (214) 988-6181. Premier Aviation personnel included the author, representing engineering and Mr. Johnny Munoz, Director of Operations.

### Static Load Test

In accordance with the test plan, a downward and drag load were applied simultaneously. Figure 1 shows the basic test setup. Figure 2 shows the drag load applied 15 inches below the Nightsun mounting point. This is the Nightsun pivot axis. The following loads were applied:

Downward Load applied with weights hung from a fixture which applied the load through the c.g. of the SX-16 Nightsun.

Requirement	= 210 lbs.
Actual	= 210 lbs.

Drag Load applied with a spring scale. Figure 3 shows the spring scale loaded at 175 lbs. The load was held for five seconds.

Requirement	= 165 lbs.
Actual	= 175 lbs.

At the conclusion of the test, all test hardware was inspected. No evidence of deformation, damage or failure were found. The test is considered successful.

### Ground Clearance Measurement

The aircraft was raised on jacks to a point where the skids were 1/2 inch off the hangar floor. Figure 4 shows the skid gear clearance. Figure 5 shows the front and rear clearances of the SX-16 Nightsun above the hangar floor. The following are the calculations for the minimum clearance.

	Front Clearance	Rear Clearance
Nightsun/Floor Clearance	10.5 "	10.75"
Skid Gear/Floor Clearance	<u>0.5"</u>	<u>0.5"</u>
Nightsun Minimum Clearance	10.0"	10.25"

The Minimum Clearance with no weight on the skid gear is 10.0 inches.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

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CODE IDENT NO.

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DWG NO.

E93-304

SCALE: N/A

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SHEET: 7 of 13

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## CONCLUSIONS

At the request of Bell Helicopter Textron, Canada, a test of a SX-16 Nightsun installed on a Bell Model 412 was performed. The SX-16 was installed per Premier Aviation STC SH7744SW, "Installation of a SX-16 Nightsun, Belly-Mount Configuration." Compliance was shown with FAR 29.303, 29.307, 29.337.

A downward load simulating the limit maneuvering load factor of 3.5 g's was applied simultaneously with the drag load. At the conclusion of the test, all test hardware was inspected. No evidence of deformation, damage or failure was found. The test is considered successful.

The clearance between the bottom of the SX-16 Nightsun and the ground was measured with the aircraft off the ground with no weight on the skid gear. This clearance was measured at 10.0 inches.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

CODE IDENT NO.

DWG NO.

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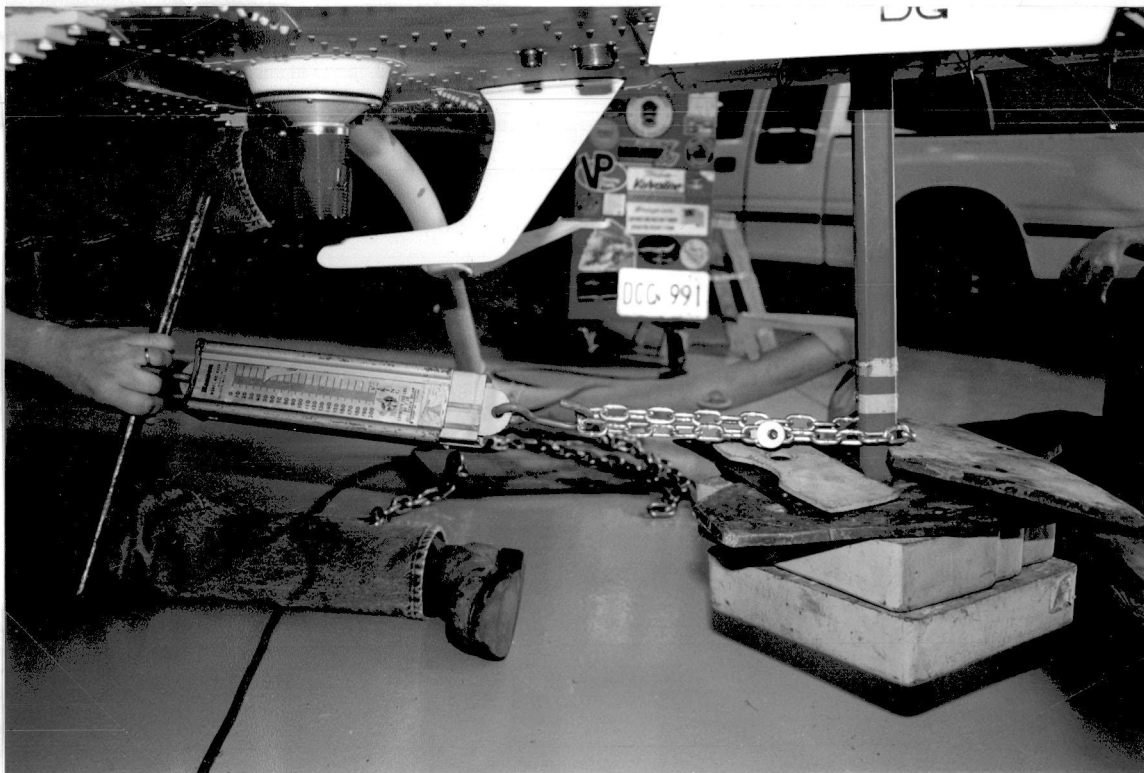


Figure 1. SX-16 Nightsun Installation During Application Of The Combined Drag And Downward Maneuver Loading.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE	CODE IDENT NO.	DWG NO.
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SCALE: N/A	REV: A	SHEET: 9 of 13

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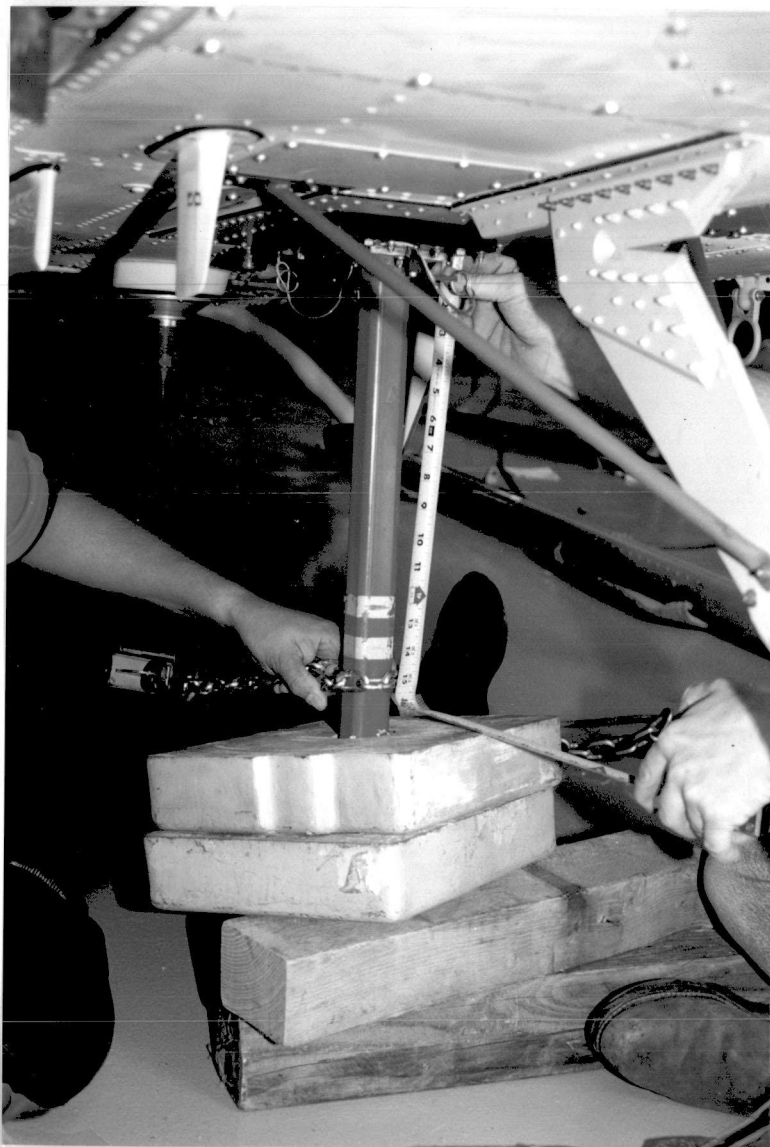


Figure 2. Drag Load Application Shown To Be 15 " Below The Mounting Hardware.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

CODE IDENT NO.

DWG NO.

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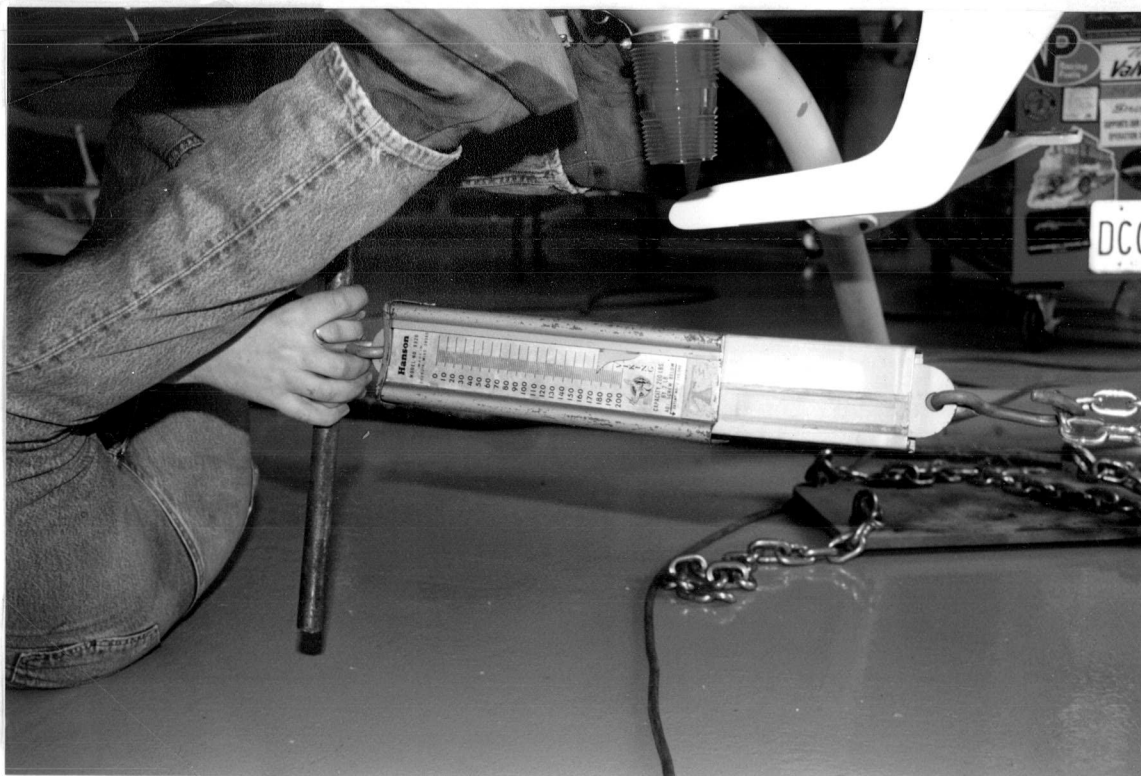


Figure 3. Application of Drag Load Shown on Spring Scale.

STATIC TEST OF THE BELLY-MOUNTED  
SX-16 NIGHTSUN INSTALLED ON THE BHTI 412  
HELICOPTER

SIZE

**A**

CODE IDENT NO.

**OSUV8**

DWG NO.

**E93-304**

SCALE: N/A

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SHEET: 11 of 13

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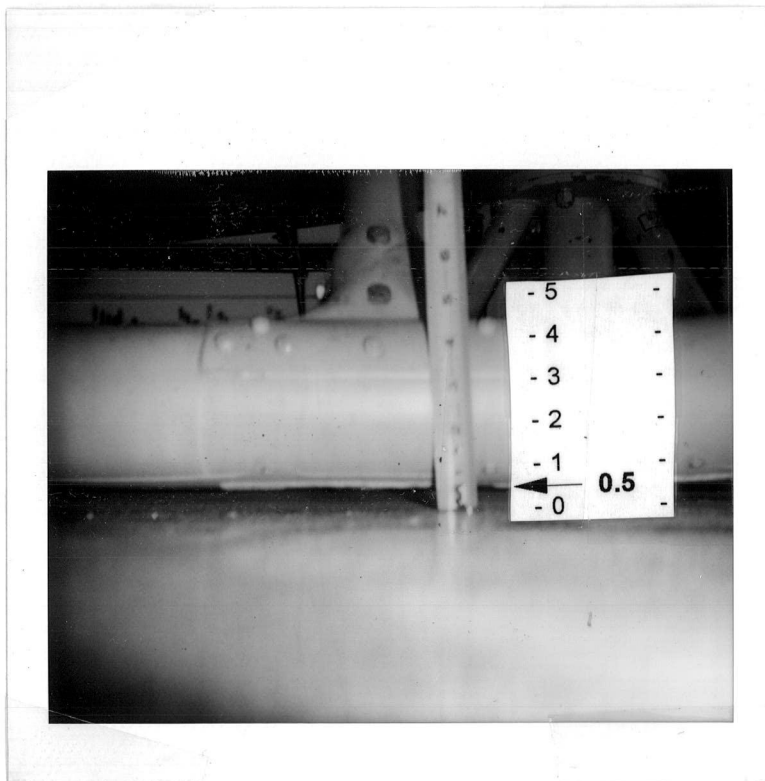


Figure 4. Model 412 Skid Gear Shown 1/2" Off the Hangar Floor.

STATIC TEST OF THE BELLY-MOUNTED  
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HELICOPTER

SIZE

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DWG NO.

**A**

**OSUV8**

**E93-304**

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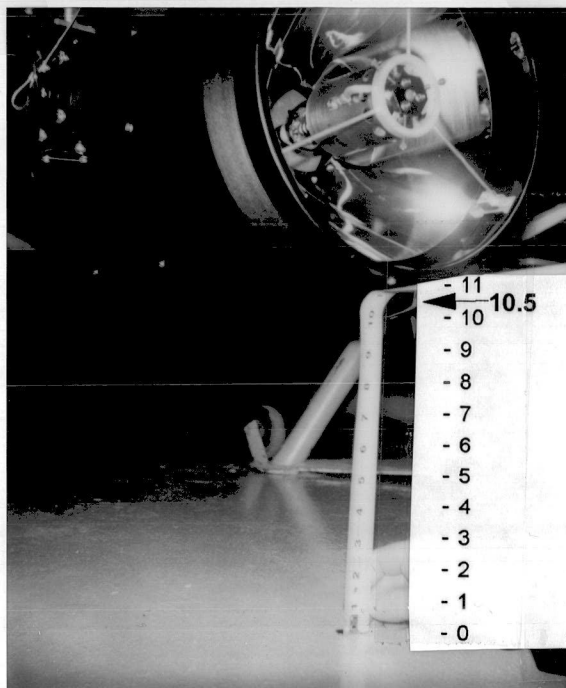
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SHEET: 12 of 13

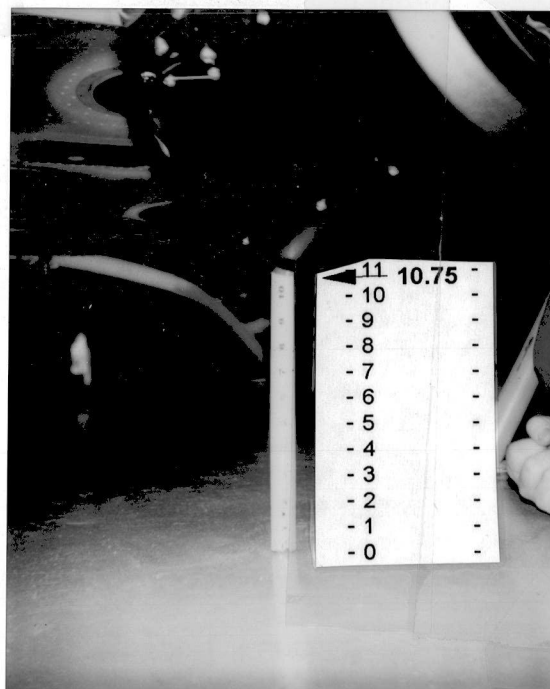
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(a) SX-16 Front Edge Clearance



(b) SX-16 Rear Edge Clearance Measurement.

Figure 5. Measurement of Front and Rear Edge Clearances of the SX-16 Nightsun.

STATIC TEST OF THE BELLY-MOUNTED  
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SIZE	CODE IDENT NO.	DWG NO.
<b>A</b>	<b>OSUV8</b>	<b>E93-304</b>
SCALE: N/A	REV: A	SHEET: 13 of 13

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